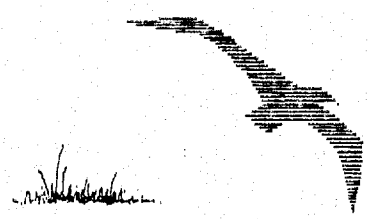
PROPOSED MULTIUSE MANAGEMENT PLAN FOR THE LOUISIANA COASTAL ZONE



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COASTAL ZONE MANAGEMENT STUDIES

Proposed Multiuse Management Plan for the Louisiana Coastal Zone

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INTRODUCTION

In early 1969 the Coastal Resources Unit adapted the development of a management plan for the Louisiana Coastal zone (Fig. 1) as its major research objective. Through a series of contracts from the New Orleans District, U.S. Army Corps of Engineers, the NOAA Office of Sea Grant, the Louisiana Wild Life and Fisheries Commission, and the State Mineral Board, steady progress toward the objective has been made. Although none of the contracts specifically authorized the development of a management plan for the entire coastal zone, each contract has involved specific tasks related to environmental setting or resource management and land use.

Total funding of projects which have contributed directly to the study during this three year period totaled $416,953. In addition, invaluable data have been contributed by projects of the Office of Sea Grant Development and the Coastal Studies Institute.

The studies have progressed through several distinctive stages:

1) Review of natural processes and forms and synthesis of quantative data
   a) Geological, ecological
   b) Hydrology and water chemistry (salinity, temperature, sediment load, discharge)
   c) Water balance - runoff studies

2) Problem definition
   a) Land loss
   b) Salt water intrusion
   c) Canals, dredging, land reclamation

3) Development of management plan and "creative" approaches
   a) Land use recommendations
   b) Dynamic Management: (water chemistry, levels, regimes and controlled delta building)
   c) Use of salt domes

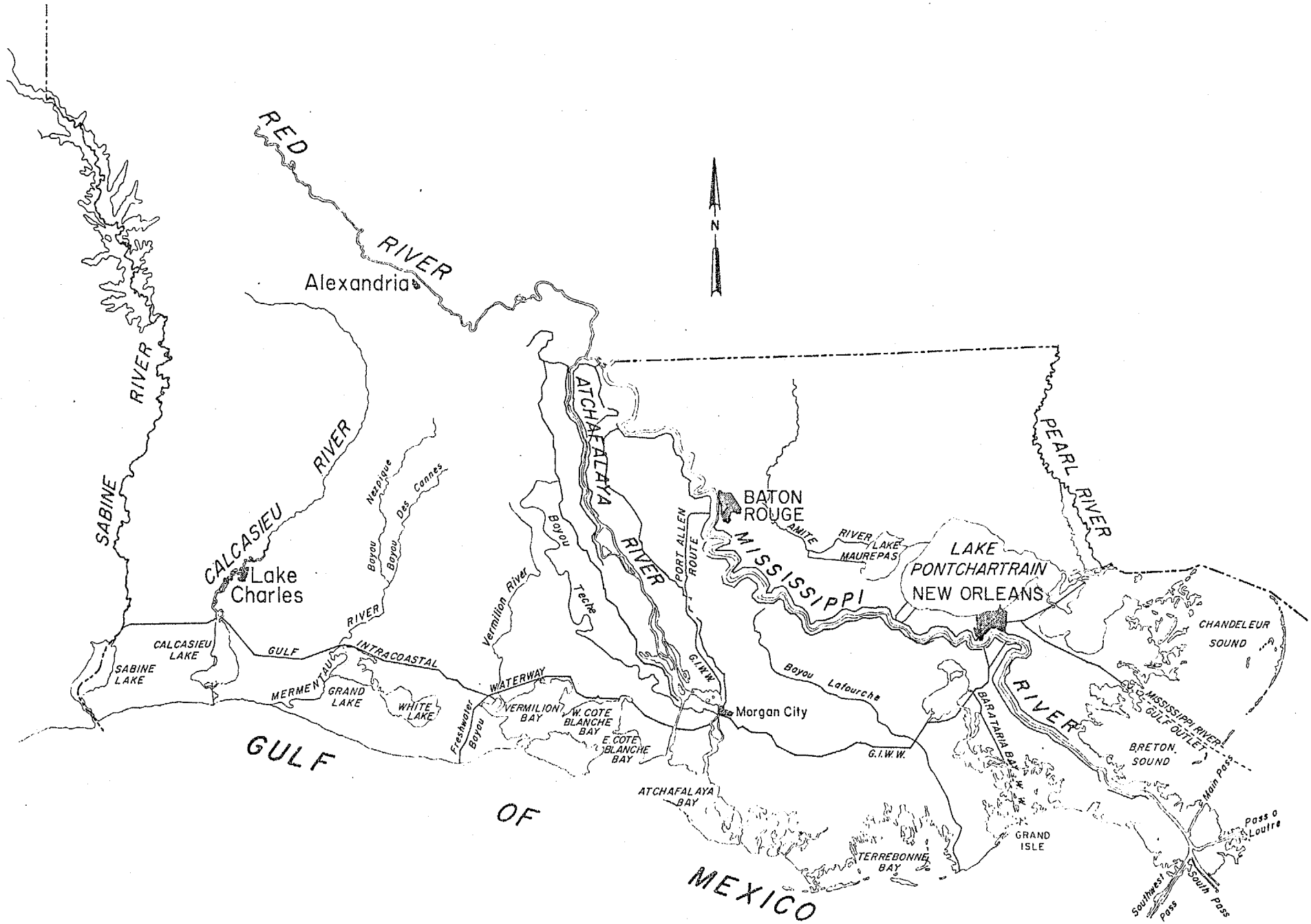

Figure 1. The Louisiana coastal area.(After U. S. Army Corps of Engineers, Lower Mississippi Valley Division, 1971.)

d) Corridors
e) Barrier Islands

Results of the individual control studies have been documented in a series of technical reports and journal articles, listed in the appendix to this paper. These reports provide much of the basic data upon which the plan presented herein is derived.

As the title implies, the plan is proposed as an approach to multi-use development of the resources of the coastal zone that will provide for both growth and development of the area's population and economy, management and use of those renewable and irreplaceable resources which are vital to the nation, the state and the quality of life of the region's inhabitants.

APPROACH

Throughout the many studies that have led to projection of a management plan for the coastal zone, there has been a focus on the development of a methodology for environmental evaluation. Proceeding from the assumption that the best basis of projection is a sound understanding of the area that is to be planned, scientific processes and knowledge have been applied to meeting immediate and practical needs. The subject area of environmental evaluation has progressed tremendously in the past few years and using environmental data to plan is now a well accepted technique. The approach recognizes that Louisiana's coastal zone is unique in both natural landscape and cultural processes and has used these inherent qualities and values as a basis of projection.

The natural setting of the coastal zone of Louisiana can be summed up in one word, "dynamic." We enjoy one of the most rapidly evolving

areas of the world. This causes many problems, but at the same time offers many opportunities. The coast is the product of the delta-alluvial system of the Mississippi River in contact with the marine forces of the Gulf. The landscape forms the natural levees, the fresh water swamps and marshes, the brackish marshes of the coast, the terrace and prairie lands, the bayous and water courses, and the coastline of offshore islands--all are in a changing and constantly evolving relationship.

Changes are often so rapid and seemingly so complex that one might view them as random and unpredictable, but that is not the case. Over the years (based on our studies of coastal wetlands) we have developed a good understanding of the form and process relationships that exist in this coastal area. It is now possible to predict with a high degree of accuracy the probably effect of any major modification upon the environment. It is this prediction capability that permits the development and selection of possible alternatives for the future use and management of our resources.

The inherent values of the coastal zone are many and varied, and it is the retention and development of these values that makes the planning essential. The economic values of the coastal zone have been well documented. For example, oil and other mineral extraction industries, commercial fisheries, the harvesting of fur animals, and the high recreation use of the coastal zone are self-evident. Major cities, dependent upon connection to the Gulf and inland areas, have developed at high land points or on the fringes of the wetland areas. Of no less value, the coastal zone is a scenic, historic and recreational resource.

Other renewable resource values include storage of surface and ground water, and wildlife habitats.

The history of man's occupation of Louisiana's coastal area has indeed been quite long, testifying to its past and current values as a living environment. Man's presence in the area has been documented back 12,000 years and there is evidence of more or less continuous use since that time. Early European settlers and more modern civilizations have tended to make extensive and often wise use of the land as they settled, farmed, developed the levee lands, and fished and hunted in the wetlands. Road and water transportation have long played a major role in development of the region and are essential components. In more recent times, as man has tried to overcome the hazards of floods and storms, and as extraction of subsurface minerals and use of other resources has become more pressing, the environmental base now shows signs of serious, perhaps irreversible stress. There is a real danger that many of the values traditionally cherished by the people are being threatened or lost through environmental and cultural pressures. The prime basis of a coastal zone management plan is to achieve a compatible relationship between the land base and the needs of people, one which will be mutually beneficial, now and in the future.

In concept, the plan recognizes environmental opportunities and constraints. It recognizes that man must make adaptions of the environment for his successful use and occupation of the land. It points out that man must use restraint in manipulating the environment if it is to continue returning long term values to him. Man is a user and a steward of the land.

The plan for the coastal zone is based upon two major concepts. The first is that of a corridor-basin relationship. Within the coastal zone are two broad, natural land systems, the natural and protected levee ridges where historically human settlement has taken place, and the wetlands that throughout history have been the major renewable resource base of the state. The plan recognizes the value of this physiographic and historic pattern and emphasizes the levee systems as sites for transportation and development corridors with conservation of the wetlands as water system recharge and natural resource development areas.

The second concept recognizes the need for successive and changing land use in an orderly sequential manner. This is necessitated by the dynamic nature of the natural systems of the coastal zone. We must recognize and accomodate natural changes by modifying land use through time. The system cannot be held in a static condition. The old engineering dream of "harnessing the river" will surely destroy the viability of the Louisiana coastal zone.

The concept of sequential use can be extended to man's activities. Facilities for mineral extraction, industrial plants and certain public works projects have a limited life expectancy. When such facilities are designed an attempt to predict some future land use of the site should be made to avoid irreversible environmental modifications that are not compatible with predicted future use.

THE PLAN

The map accompanying this report (enclosure envelope) is based on major natural and cultural elements of the coastal zone landscape. It

presents a broad-brush proposal for management and development of the Louisiana coastal zone. Boundaries between units are drawn from natural contacts, ranking of environmental opportunities and constraints, and from historic and projected land use patterns.

Barrier Island, Reef and Gulf Shore Areas

These features represent the first line of defense against hurricane forces and marine processes. Tidal inlets and streams associated with the islands, reefs and Gulf shore are the control valves of the estuaries, regulating inflow and outflow of Gulf water. The islands are invaluable as wildlife habitats and scenic-recreation areas. These features are undergoing rapid changes as a result of coastal erosion, accelerated regional subsidence, and hurricane damage. For example, large shell reefs in the vicinity of Atchafalaya Bay and Marsh Island lie within areas leased for shell dredging and soon may be destroyed. Canal dredging on the bay sides of a number of the islands for oil rig locations and pipelines has seriously increased their vulnerability to storm surge damage.

Grand Isle, the most stable of the Louisiana barrier islands, is accessible by highway and is important as a recreation area, as a base for the offshore oil industry and as a fishing port. Frequent hurricanes and coastal erosion are a continuous threat to life and property on the island. Similar permanent development of other barriers should be discouraged.

It is recommended that top priority be placed on management of these units as natural barriers against storms and marine forces (including tidal inflow and outflow of Gulf water) and as wildlife and

scenic-recreation areas. Their maintenance is vital to the continuing viability of the natural systems in the coastal zone. Detailed studies of erosion and deterioration should be initiated immediately in order to implement restoration and management. The islands are so vital to the future of the coastal zone that they should be in public ownership.

Estuarine Nursery Areas

From the standpoint of biological productibility the estuaries represent the most productive acreage in the state. Not only are they the foundation of the state's fishing industry, but they provide important habitats for migratory waterfowl, fur bearing animals, and reptiles, and are important scenic-recreation-open space areas. The units are defined on the basis of distributions of salinity, marsh vegetation, oyster beds and length of land-water interface per unit area.

These areas should never be drained or reclaimed for other uses, even agriculture. Recent overflights indicate that thousands of acres of marsh in the estuarine nursery areas are in an advance state of deterioration. Programs of marsh restoration and management should have the highest priority and should be initiated immediately. Such programs should include a detailed systematic evaluation of the marsh condition followed by a water management program designed to conserve runoff, reduce salt water intrusion and curtail erosion.

Although the map is intended to be a clear statement that the primary management objective in these units is for renewable resources, we also recognize that mineral extraction industries are active in these areas. If it becomes necessary to drill new wells, develop new fields or lay new pipelines, the surface modification associated with

these activities must be made compatible with the primary management objective.

The concept of sequential use is also important. Since an oil field has a life expectancy of 35-70 years, we must plan for future use of areas now occupied by fields. In many instances creative planning of canal geometry and spoil disposal could create new habitats, conserve freshwater runoff, and enhance the environmental setting. In general, canal dredging should be minimized. Directional drilling should be used to reduce the number of well locations and pipelines should be confined to corridors. Surface features should be considered in all future mineral industry planning. These same guidelines apply to extraction industry activities in all of the renewable resource management areas, and will not be repeated.

Fresh-Brackish Marsh Areas

Largely unbroken fresh to brackish marshes and associated lakes, ponds, and waterways occupy a major portion of the estuarine zone south of the Gulf Intracoastal Waterway (GIWW). They are delineated on the basis of distributions of salinity, fauna and flora, configuration of streams and water bodies, and length of water interface per unit area. Like the estuarine nursery areas, these marshes are vital components of the highly productive estuarine zone. They are of primary importance to migratory waterfowl, fur-bearing animals and commercial species of reptiles (alligator). They provide scenic-open space-recreation areas and are of considerable value to the commercial fishery. In addition, these marshes, along with other renewable resource areas located south of the GIWW, provide a critical buffer zone against storm

generated surge and prevent serious inundation of inland communities. With regard to land-use it should be pointed out that in these units, thick underlying deposits of peatsand, soft clays provide poor foundation conditions.

Priorities and management recommendations are essentially the same as those outlined for the estuarine nursery areas.

Fresh Water Basins

Seven major fresh water basins are identified on the map. All lie north of the GIWW. They are dominated by extensive swamps and marshes, rounded lakes, and sluggish backswamp drainage networks. They are usually underlain by thick deposits of peat and organic clay, which provide very poor foundation conditions and limit land use. Their value as wildlife habitat areas is well known not only to the sportsmen and naturalists of the region, but to a large segment of the general public as well. These basins are also important as natural reservoirs ensuring fresh water flow into the estuarine zone south of the GIWW throughout the year. This fresh water influx is one of the primary factors in controlling water chemistry in the estuarine zone south of the GIWW. Alteration of the flow regime in some of these basins through drainage projects, canal dredging, flood control projects, and highway embankments is presently one of the major factors in increased salt water intrusion in the estuaries.

These basins must be managed as renewable resource areas. Forestry, fisheries, and recreation are the main uses recommended. Dredging should be minimized, and draining and reclamation prohibited. In most instances

highways traversing the basin should be elevated on piers or piles. In general, introduction of any new linear elements should be discouraged. If unavoidable they should be confined to corridors parallel to existing highways, pipelines, etc. Water storage in the basins should be managed in order to optimize water chemistry in the estuaries to the south.

Existing corridors through these basins should be de-emphasized from the standpoint of development. For example, Highway U.S. 90 between Boutte and Raceland is an important transportation link, but should not be encouraged as a development corridor.

Guidelines pertaining to the mineral extraction industries are essentially the same as those proposed for estuarine nursery areas. In addition, construction of tramways or roadway embankments in inland swamps and marshes should be minimized. Such features often redirect freshwater runoff in the basins and provide obstacles to the movement of aquatic and terrestrial animals.

Areas Suitable for Development

In general, areas suitable for development are those places that have good foundation conditions, good drainage, and are reasonably safe from flooding. Pleistocene terraces, salt dome islands, and natural levee ridges form the higher, positive topographic elements in the Louisiana coastal zone that are designated as suitable for development. Historically agriculture, industry and settlement have been largely restricted to these areas. Attempts to extend these activities to adjacent wetlands have often proved to be catastrophic.

The key to proper use of these areas is careful planning. A good

mixture of urbanization, industry, and agriculture in these areas will insure both orderly growth and economic development and a good place for people to work and live. Soil and meteorologic conditions should be mapped in detail and suitability for agriculture ranked. Prime agriculture areas should be identified and promoted in every way possible. The rich rice growing area of southwestern Louisiana, for example, should be maintained primarily for agricultural use.

Development Corridors

These are primary elements in the proposed multiuse management plan. They represent areas that are already heavily developed or where development is projected. In most cases, the corridors are confined to land surfaces suitable for development. In some instances however, "natural" corridors have been expanded to boundaries formed by prominent man-made features such as major navigation canals or flood protection levees. For this reason some of the land included within the development corridors has poor foundation conditions and is flood prone. The rationale for expanding some natural corridors is to provide adequate area for development so that random extension into renewable resource areas can be controlled.

In addition to land suitability, locations of development corridors are dictated by major land and water transportation arteries, historic land use patterns, and the necessity to maintain rather than dissect existing natural entities. The term development corridor is not to imply blanket urbanization or industrialization. Creative planning is again recommended to provide the best mix of land use in these areas. The primary use however is for development.

Public works projects should be focused on the corridors to strengthen and further define them. Highways, flood protection levees and structures, drainage projects, should be incorporated into the corridor plan. Such projects should be combined wherever possible to minimize land acquisition and costs. There is no reason, for example, why highways cannot be constructed on the crests of levees. This is a standard procedure in the Netherlands and many other parts of the world. Water resource management, mass transit systems, and regional waste collection treatment systems should likewise be incorporated into the corridors. Linear elements such as pipelines, power lines, should be incorporated in the corridors.

The contact between corridors and intervening renewable resource management areas presents an interesting challenge to the planner. Should it be smooth or crenulated? Should access points between development corridors and marshes or swamps be linear or nodal? Only detailed environmental analysis can provide the answer to these specific planning and design decisions.

In some instances the continuity of a development corridor depends on a transportation link across a wetland area. A classic example occurs between Lafitte and Larose. We believe that a transportation link between these two places is important to orderly development of the coastal zone. It is also recognized that excessive development across this area is likely to cause serious deterioration of the rich Salvador-Barataria estuary system. In these instances we propose, therefore, that future highways be elevated on structures with permanent restrictions against off ramps. This same principal can be applied in a number of

critical areas; notably in the St. Charles Parish wetlands along the south shore of Lake Pontchartrain where I-10 and I-410 will join, and along the Atchafalaya Basin crossing of I-10.

Geometry for Development

We believe that the development corridors shown on the plan represent an excellent geometry for future growth and development of the coastal zone that is compatible with management of renewable resource areas. The great oval linking Lafayette, Baton Rouge, Hammond, Slidell, New Orleans, Larose, Houma, Morgan City, Franklin, and New Iberia is one of the most basic elements in the orderly use of the coastal zone. Reinforcement of this oval-shaped corridor should have highest priority. The southern Lafayette-Houma-Slidell arc is of particular importance. An interstate highway along this arc would be very important. Improved transportation along this arc would provide easy ingress and egress to the coastal zone making its opportunities available without necessitating overpopulation. Urbanization should be encouraged on the well-drained surfaces near the poles of the oval. The Slidell-Hammond-Baton Rouge area and the Opelousas-Lafayette-New Iberia area satisfy most of the site requirements for good urban development. Much of the southern arc is also suitable for urbanization, but on a somewhat reduced scale. The Thibodaux-Houma area, for example, would eminantly provide for urban growth. The channels and natural levee ridges of the Mississippi River and Bayou Lafourche represent major trans-coastal development corridors, and the state's most important gateways to the Gulf. This corridor should be reinforced although it must be asked what the capacity of it is. Is

there a limit to industrialization in this corridor or can every acre of the natural levee be utilized? The banks of the Mississippi River already are lined with industry and many additional plants are anticipated. Air and water pollution are an inevitable consequence of this industrialization. To what extent can the natural system absorb even a minimum of pollutants?

Despite these unknowns, the Mississippi River is, and will continue to be, the state's most valuable asset. Its channel should be improved to a navigation depth of 55 feet. The lower end of the Mississippi corridor should be reinforced. Venice is destined to become an even more important support facility for the offshore oil and gas industry and future superport development.

The Lafourche corridor should be reinforced with improved highways and flood protection. However, flood protection levees should not be extended south of Golden Meadow. The proposed Lafourche by-pass channel would define the western margin of an expanded natural corridor. Old beach ridges near the mouth of Bayou Lafourche at Port Faurchon may serve as the foundation for onshore port facilities, related to a deep water harbor. Although some port facilities may be permitted, development of petrochemical, or other heavy industry should be discouraged because of incompatibility with recreation uses in immediately adjacent areas.

Minor trans-coastal corridors include Bayou Terre aux Boefs, Bayou Petite Caillon, Bayou du Large, the Atchafalaya River, Bayou Sale, Bayou Cypremont, Fresh Water Bayou, the Calcasieu River, and the Sabine River. Each of these corridors will play an important role as outlets for recreation, the fishing industry, the offshore mineral industry and to some extent, as commercial ports. However, further widening and deepening

of associated navigation channels is discouraged because of the salt-water intrusion problem.

The roles of other minor development corridors in the upper coastal zone are apparent from their locations and form. The geometry of the development corridors and environmental management units lends itself well to evaluation of both the proposed deep water port to be located off the Louisiana coast, as well as regional air carrier terminals. In previous papers we have indicated that the best probable site for the superport would be in the west delta area south of Grand Isle. The Lafourche corridor can adequately service an initial oil port. As later stages of the facility develop, which may include containerized and break-bulk cargo handling, a 55 foot navigation canal with a control lock should be constructed to link the superport with the Mississippi River at Venice.

If surface transportation in the corridors is improved as suggested, two major regional airports should be adequate for serving the region. A long term plan for gradual upgrading of the Lafayette Airport should accomodate the western half of the corridor network. A new facility located in the vicinity of I-10 and the proposed I-55 near Laplace would serve the eastern half of the corridor oval. The site should be on the natural levee ridge if at all possible. The Bonnet Carre floodway is a good potential site. However, if the Bonnet Carre lands are used for this purpose an equal acreage of adjacent wetlands should be purchased as a recreation area. The airport should not be built in the swamps south of Lake Maurepas or along the southern shore of Lake Ponchartrain because of exceptionally poor foundation conditions and the value of these

areas for open space and recreation use.

There is presently a rash of proposals for new towns and harbor towns in the coastal zone. A number of these proposals involve the use of public lands or require government assistance in the form of flood protection, drainage, access roads and other aspects of site preparation. A number of the proposals would involve significant loss of wetlands and create major water pollution problems. There are many excellent sites for new towns within the development corridors and those areas suitable for development. The consumer will pay heavy penalties in increased site preparation, maintenance costs, and tax burdens for any urbanization or development in wetland areas of the coastal zone. All land reclamation, including "Florida type" canal and homesite developments, for urbanization should be prohibited.

The new community concept is an excellent one. New towns property placed within development corridors would guarantee a more orderly growth of the region. A limited number of harbor towns at carefully selected locations would also be a major asset. However, the locations should be pre-determined by the geography and hydrology of the region and not simply by the wishes of land developers. Since harbor towns can have major environmental impact, additional study is recommended to determine favorable locations and sizes.

ENVIRONMENTAL ENGINEERING

When coastal Louisiana was in a virgin condition nature did a superb job of environmental management. Balanced environmental conditions resulted in high biological productivity, and in general the system was self-maintaining. Erosion occured along some parts of the

coast, but this was more than compensated for by new land built in the vicinity of the active outlets of the river.

Man's impact has caused serious imbalance in the systems. One symptom is massive marsh deterioration and land loss. Land in the coastal area is being lost at a staggering rate of 16.5 mi^2 per year and a 30 year loss of almost 500 mi^2 has been measured. It is not an exaggeration to say that the delta is dying.

We must restore the delta and manage it to optimize natural productivity. This can be achieved by directing natural processes. For example, the freshwater outflow and transported sediment load represent a tremendous amount of energy and supply of materials. The delta has literally been constructed by this energy source and material supply. By redirecting flow and helping the river to initiate new cycles of delta building, new marshlands and estuaries can be built. Prime areas for these activities are designed as controlled delta building areas on the map. Our studies indicate that the Atchafalaya has been building a marine delta lobe since about 1950 and if not interrupted, some 100 mi^2 or more of new marshland will have been added to the coast by about the year 2000. Similarly for relatively small investments of flow and sediment, very large areas of land could be constructed along the lower Mississippi River in relatively short periods of time (30-50 years).

Our work has also documented a need for supplementary fresh water for estuarine management. Supplementary water introduced through control structures from the Mississippi and Atchafalaya Rivers into the estuaries could be used to optimize salinity conditions and restore

a more favorable balance in these systems. A comprehensive surface water management plan is now being developed for south central Louisiana (Terrebonne-Barataria area) and will be presented in a forthcoming report.

Erosion control is fundamental in the coastal zone, but is especially challenging as there are over 30,000 miles of land water interface south of the GIWW and much of it is eroding. We have no suggestions to make regarding erosion control along the barrier islands except to re-emphasize that the problem is critical.

One approach to erosion control along the muddy shorelines of large lakes and bays would be the construction of barrier islands. As shown in Figure 2, the islands typically would be 1/4 to 1/2 mile in length and separated from the shore by a shallow lagoon. Passes would be left between individual islands. The islands would be constructed around a rigid structural core of interlocking metal sheet piles, concrete tetrahedrons, or some similar rigid skeletal material. The body of the islands would be composed of lake or bay bottom sediment supplied by suction dredges or large drag lines. The seaward edge of the islands would be veneered with gravel, shell, sand, or some other coarse grained material that would absorb wave energy. The (tidal) passes would be lined with rip-rap or some other rigid, erosion resistant material. A soft edge would be left on the lagoon side of the islands and would be planted with marsh grass.

Although this type of erosion protection would be relatively expensive, it has a number of important advantages. Islands would not only prevent erosion, but would also reduce storm surge without

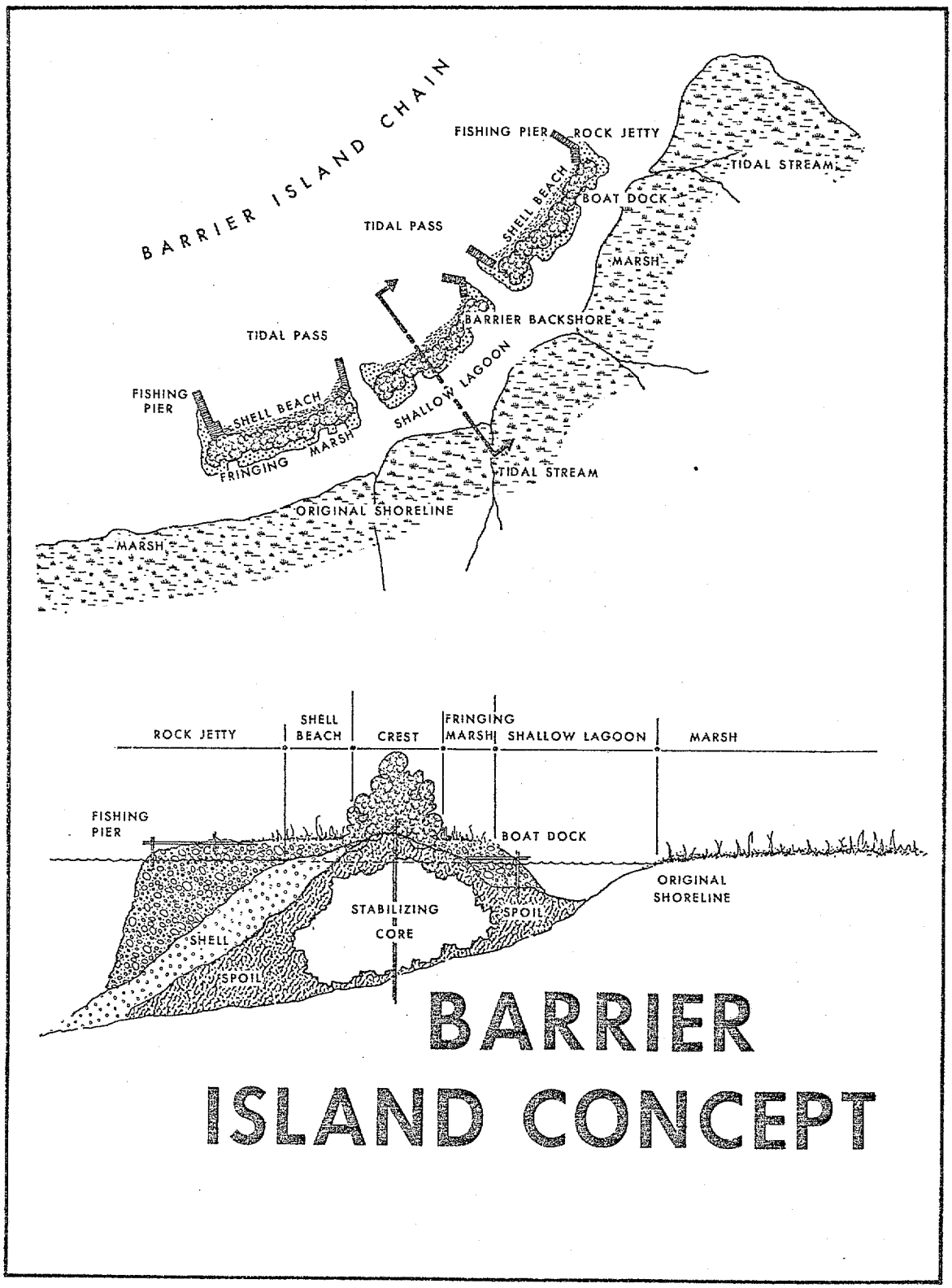

Figure 2. Configuration of proposed man-made barrier islands.

destroying the important natural land water interface along the estuary margin. Marshes and swamps could be maintained in a natural condition landward of the lagoons. The islands would not only reduce significantly the erosion problem without damaging the estuary, but would actually enhance the total environment.

Island construction would create new, more diversified habitats. These would include beaches, vegetated island crests, lagoon fringing marshes, tidal passes and lagoons. Increased recreation opportunities resulting from this approach are particularly attractive. The beaches and passes would be ideal for (surf) fishing and other water contact recreation. Island backslopes and crests provide picnic areas and camp sites, and lagoons could function as small boat shelters. The new natural environments could also provide for wildlife and fish habitats. These would include lagoons for oyster beds, passes for fin fish and crustaceans, fringing marshes and lagoons as estuarine nursery areas and habitat for migratory waterfowl, fringing marshes and regulated island crests as mammal and reptile habitats, and beaches, passes and island crests as habitats for shore and wading birds.

As shown on the map, man-made barrier islands should be constructed on the margins of large lakes and bays in places where the wetlands are of high value for recreation and/or as estuarine nursery areas and wildlife habitat. A typical application would be along the western margin of Lake Borgne, where erosion is not only destroying valuable marshes, but also is destroying a number of historic and archeological sites.

The barrier islands illustrate an important concept of environmental engineering. That is, if energy and resources must be expended to solve a problem it is often possible to reap additional benefits by creative planning. Subtle changes in elevation and geometry alter natural processes to create favorable opportunities for desirable fauna and flora. The same approach could be applied to the geometry of oil field canals and spoil disposal sites that might result in environmental enhancement instead of deterioration for the same expenditure of energy and resources.

There are several unique features in coastal Louisiana that may be of considerable value in solving problems of regional waste collection and treatment. As previously mentioned, regional sewage collection systems should be confined to development corridors. Urban sewage has some nutrient value to the estuary system if bacteria can be eliminated. Pilot studies of marsh enrichment are presently in the planning stage.

As shown on the map, aquifer recharge areas of the Terrace Uplands are in relatively close proximity to coastal urban centers. Using these areas and the seaward sloping aquifers that they supply, soil filtration of sewage may be highly feasible in south Louisiana.

Another approach, currently under investigation by the CRU research group, involves use of large solution cavities in subsurface salt domes as reaction chambers for generating methane gas and other usable byproducts. Man-made solution cavities in salt domes are presently used on an operational basis for storage of liquid propane. We propose that raw sewage could be introduced into such cavities, where with the

introduction of selected catalysts and temperature control, gas generating reactions might occur.

Although rapid transit does not fit comfortably within the category of environmental engineering, it is viewed as an important consideration in future development and management of the coastal zone. The proposed development corridor geometry lends itself well to application of rapid transit systems. It would provide one means of allowing people to work, use, and recreate in the lower coastal zone without destroying it by overpopulation. In this region the very large capital outlay required for design and construction of a rapid transit system and even subsidy for operation might be justified in terms of renewable resource savings.

Although an in-depth discussion of navigation channels is beyond the scope of this paper, a few specific comments may be in order. It is recommended that a 55-foot deep navigation channel be constructed from the Mississippi River southwest to the Gulf in the vicinity of the Jump at Venice. A major lock that would accomodate ocean-going vessels should be included in the project. Although initial costs would be very high, major benefits would accrue from the project. The channel would bypass the shoal areas associated with the mouths and lower reaches of South and Southwest Passes. The lock would greatly reduce the costs of maintenance dredging and alleviate the threat of salt-water intrusion during low river stage. The channel would provide a link between the Mississippi and the recommended superport site. If this channel and lock were constructed, maintenance of Southwest Pass for navigation could be discontinued, representing a considerable cost

savings. Further, this closure would release approximately 30% of the lower river's discharge and flow for environmental management purposes. This water and sediment could then be used for controlled delta building. The project would have both economic and environmental benefits.

In general widening and deepening of natural channels and dredging of canals from the Gulf inland creates serious environmental problems. Salt-water intrusion, accelerated runoff, and increased tidal exchange, all accelerate marsh and swamp deterioration and erosion. In this regard, the Mississippi River Gulf Outlet (MRGO) has had catastrophic environmental effects. The channel has greatly accelerated deterioration of what was once one of the state's most productive estuary areas. Economically, the project has been a failure. It was originally constructed as a short-cut for ocean going vessels between the Gulf and the Port of New Orleans. Because the channel is narrow (500 ft) and shallow (35 ft) and prone to shoaling as a result of massive bank failure, it is little used. Only a small fraction of ocean-going traffic uses the channel. Primarily because of the unstable banks, maintenance costs have been exceptionally high--averaging $3.9 million per year. Because of these reasons and because the Mississippi River can and will continue to serve the navigation needs of New Orleans, Baton Rouge, and other river ports, it is recommended that maintenance of MRGO for ocean-going vessels be discontinued.

Proposals to improve navigation in the lower Atchafalaya (Atchafalaya River and Bayous Chene, Boeuf, and Black Project) have serious environmental considerations. Little consideration has been

given to the impact that this channel would have on delta building processes presently occuring in the bay. This project should not be implemented until the environmental impact is thoroughly understood.

IMPLEMENTATION

Obviously, the implications of the proposed plan are far reaching. While beneficial to some landowners, many communities and the state and the nation in general, implementation would undoubtedly impose financial and social hardships on a considerable number of individuals. The emphasis of our studies has been on the environment and suitability of the landscape for certain uses. Although not considered here, social, economic, engineering, and legal considerations are equally important.

The necessary legislation and authority to partially implement such a plan may be already in effect. Large public works projects can be used to reinforce development corridors and to direct growth into suitable areas. Without indirect subsidy in the form of highways, flood protection, and drainage, wetland reclamation usually is not economically feasible. Further documentation of the value of renewable resources and consumer penalties associated with misuse of wetland areas will strengthen this argument.

It is fully recognized that private land owners must be compensated for loss of property rights and revenues, or for participation in environmental management programs. This has been done in other states through tax reliefs, scenic and use easements, and direct lease. Public acquisition is recommended for the most important renewable resource areas, and unique environmental and cultural features.

A continuing program of environmental and land use research, and public education is vital. Systematic ranking and evaluation of our resources and a public awareness of their value will insure responsible decisions from elected and appointed public officials. It is essential that the state and local areas gain control of their destinies. Decisions that may result in the deterioration of the environment and the quality of life of coastal zone citizens cannot be made in distant corporation board rooms or administrative offices.

We must learn more about the capacity of the region to absorb increases in population and industry. The natural systems already exhibit clear signs of imbalance. Rigid control standards must be imposed on industry. New industry must be compatible with the environmental setting.

Historic studies document that random, unplanned development in the coastal zone results in environmental destruction by attrition. Although impact of individual actions may seem insignificant, the culmulative effects are often of catastrophic proportions. For the past 30 years the natural environment of the Louisiana coastal zone has seriously deteriorated as a result of the impact of growth and development. The deterioration is accelerating at an alarming rate. These historic changes are documented and can be measured and future changes, if controls are not imposed, can be predicted with a high degree of probability.

The plan presented here can be compared to a single photographic frame in a very long motion picture. It represents one step in a long and continuous process. It should be modified and changed as our understanding of the natural setting of the coastal zone increases and

our ability to analyze human processes is sharpened. However, we believe that it does represent a specific point of departure and a geometry that will allow for an orderly increase in population and use of the resources of the region for continued economic growth without destroying those aspects of the region which are so fundamental to the quality of life of the people who reside there.

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Coastal Resources Unit

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Louisiana State University
Baton Rouge, LA 70803

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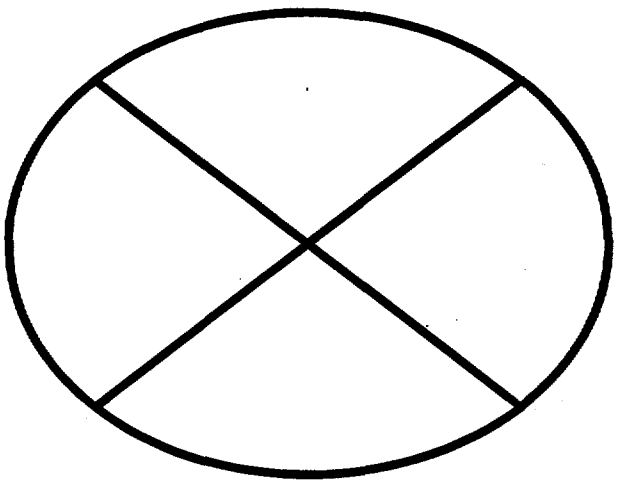

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